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A NEW SPECIES OF ASPASIA FROM PANAMA

BY

Charles Schweinfurth

In the course of identifying an interesting collection of orchids from Darien Province, Republic of Panama, the following noteworthy species of Aspasia was discovered.

Aspasia pusilla *C. Schweinfurth sp. nov.*

Herba epiphytica, pusilla. Caules congesti, supra pseudobulbosi, parte basali vaginis distichis conduplicatis imbricatis vestiti. Pseudobulbi valde complanati, saepissime plusminusve ellipsoidei, unifoliati. Folium lineare vel lineari-ellipticum, acutum, subsessile, in sicco valde chartaceum. Inflorescentia lateralis, brevis, laxe pauciflora. Flores pro genere parvi. Sepalum dorsale elliptico-oblanceolatum, acutum. Sepala lateralia elliptico-oblonga, acuta, dorso carinata. Petala sepalo dorsali similia, leviter obliqua. Labellum columnae medio adnatum, patens, suborbiculari-obovatum, marginibus (parte basali cuneata excepta) irregulariter crenulatis. Columna perbrevis, crassa, clinandrio magno concavo denticulato.

Plant epiphytic, small and slender for the genus. Roots fibrous, glabrous, numerous. Stems crowded, consisting of shortly stipitate pseudobulbs of which the slender lower portion and base of the pseudobulb are invested by distichously imbricating conduplicate sheaths, the upper sheath (on either side of the pseudobulb) being elongate and leaf-bearing; pseudobulbous portion strongly complanate, narrowly cylindric to ellipsoid, unifoliate, up to about 5 cm. long and 1.5 cm. wide in the dried specimen. Leaves linear to linear-elliptic, up to 17.5 cm. long and 1.3 cm. wide, narrowed to an acute apex, cuneate-narrowed to a subsessile base, thickly chartaceous when dried. Inflorescences one or two to a pseudobulb, lateral, short but surpassing the pseudobulb, up to about 9 cm. tall, very loosely 4- to 6-flowered, with the slender rachis more or less flexuous above. Floral bracts broadly ovate, acute, cucullate, spreading, up to 7 mm. long, membranaceous. Flowers very small for the genus, with spreading segments and with subfleshy sepals and petals. Dorsal sepal free, oblanceolate-elliptic, about 13 mm. long and 4.8 mm. wide, acute, 5-nerved, dorsally subcarinate. Lateral sepals elliptic-oblong, about 13.7 mm. long and 4 mm. wide, acute, 5-nerved, dorsally carinate along the middle. Petals similar to the dorsal sepal, obliquely oblong-oblanceolate, sharply acute, about 12.1 mm. long and 4 mm. wide, 3- (or indistinctly 5-) nerved. Lip adnate up to about the middle of the column; suborbicular-obovate in outline, spreading, about 11 mm. long and 12 mm. wide when expanded, broadly cuneate toward the base, lightly retuse at the apex, with irregularly crenulate margins except near the base; lamina slightly concave near the base with a small forcipate pubescent callus. Column short and stout, about 5.7 mm. long at the back, with a pair of prominent porrect obliquely triangular fleshy arms just above the junction with the lip; clinandrium large, with high erect and irregularly denticulate margins. Anther obliquely semiorbicular-conic, papillose. Pollinia two, complanate-ovoid.

Aspasia pusilla is remarkable for its small size and slender proportions. In having a dorsal sepal which is quite free from the column and a lip with a cuneate base, it simulates the Brazilian *A. lunata* Lindl., but it appears to lack Central American allies.

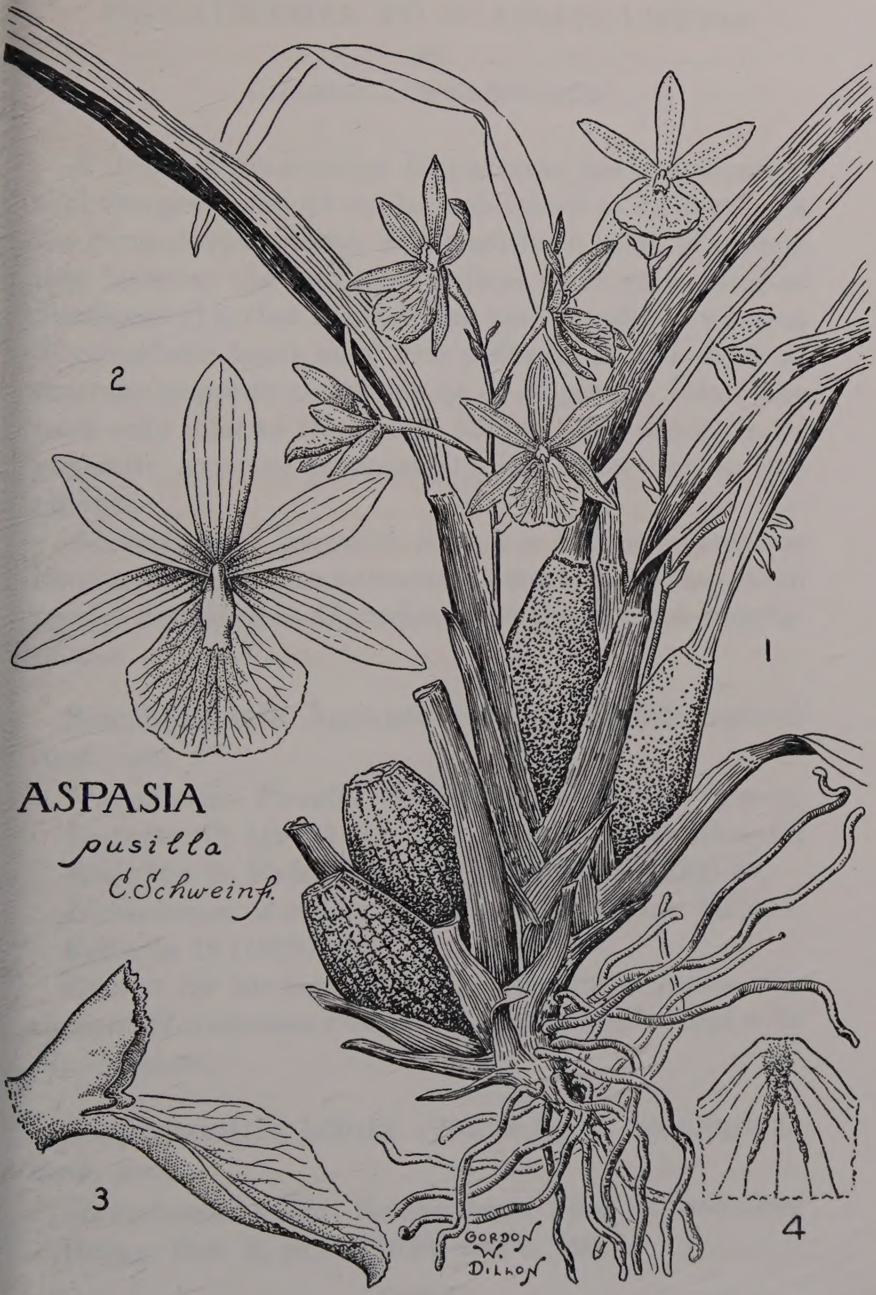
REPUBLIC OF PANAMA, Darien Province, Chepigana District, Cana-Cuasi Trail (Camp 2), epiphyte "4 to 8 inches high", at 2000 feet altitude, "outer petals greenish-yellow, maroon spot at base; lip white or yellow centrally gamboge, marked with maroon", March 11, 1940, *M.E. & R.A. Terry 1502* (TYPE in Herb. Ames No. 59568; DUPLICATE TYPE in Herb. Field Museum No. 1034500).

EXPLANATION OF THE ILLUSTRATION

Aspasia pusilla *C. Schweinf.* 1, plant, natural size. 2, flower from front, twice natural size. 3, column and lip from side, natural position, four times natural size. 4, basal portion of lip, showing callus, four times natural size.

Drawn May 1941 by G. W. Dillon

PLATE I



NOMENCLATORIAL CHANGES HEXADESMIA TO SCAPHYGLOTTIS

BY

CHARLES SCHWEINFURTH

A study of the concept *Hexadesmia* has convinced us that this genus should not be maintained as distinct from the genus *Scaphyglottis.* The traditional mark of separation between the two genera (and their only point of discrepancy) is that *Hexadesmia* has six pollinia whereas *Scaphyglottis* bears only four pollinia. If this mark of separation appears to anyone to be of generic value, one need only refer to the genus *Pleurothallis* which, in its generally accepted components, has either two or four pollinia.

Accordingly I herewith submit a few new combinations and a new name to transfer some Central American species described as *Hexadesmia* to the concept *Scaphyglottis.*

Scaphyglottis Acostaei *(Schltr.) C. Schweinfurth comb. nov.*

Hexadesmia Powellii Schlechter in Fedde Repert. Beihefte 17 (1922) 27, non Scaphyglottis Powellii *Schlechter* in Fedde Repert. Beihefte 17 (1922) 28.
Hexadesmia Acostaei Schlechter in Fedde Repert. Beihefte 19 (1923) 293.

Except for having slightly more elliptic petals, the concept *Hexadesmia Powellii* appears to be identical with *H. Acostaei.*

Scaphyglottis bifida *(Reichb.f.) C. Schweinfurth comb. nov.*

Hexadesmia bifida Reichenbach filius in Saunders Refug. Bot. 2, pt. 2 (1878) sub t. 113.

Scaphyglottis brachyphylla *(Reichb. f.) C. Schweinfurth comb. nov.*

Hexadesmia brachyphylla Reichenbach filius Beitr. Orch. Centr.-Am. (1866) 89.

Hexadesmia brachyphylla var. *longior* Schlechter in Fedde Repert. Beihefte 19 (1923) 205.

Scaphyglottis falcata *C. Schweinfurth comb. nov.*

Hexadesmia falcata C. Schweinfurth in Bot. Mus. Leafl. Harv. Univ. 8 (1940) 45.

Scaphyglottis spathulata *C. Schweinfurth nom. nov.*

Hexadesmia Jimenezii Schlechter in Fedde Repert. Beihefte 19 (1923) 293, non Scaphyglottis Jimenezii *Schlechter* in Beihefte Bot. Centralbl. 36, Abt. 2 (1918) 399.

The material which represents this species is rather sparse and consequently the concept may prove to be referable to another species.

Scaphyglottis stenotepala *(Reichb.f.) C.Schweinfurth comb. nov.*

Hexadesmia stenotepala Reichenbach filius in Bonpl. 3 (1855) 221, and in Xenia Orch. 1 (1856) 169, t. 59, fig. II, 4-5.

NOMENCLATORIAL CHANGES IN SPECIES OF SPIRANTHES FOUND IN PERU

BY

CHARLES SCHWEINFURTH

The following nomenclatorial changes have been found advisable in studying the Spiranthinae recorded from Peru.

Spiranthes laxa *(Poepp. & Endl.) C. Schweinfurth comb. nov.*

Stenorrhynchus laxus (as Stenorrhynchos laxum) Poeppig & Endlicher Nov. Gen. ac Sp. 2 (1837) 7, t. 109—Cogniaux in Mart. Fl. Bras. 3, pt. 4 (1895) 172.

Pelexia laxa Lindley Gen. & Sp. Orch. Pl. (1840) 482.

Since it seems advisable, from the viewpoint of simplicity, to follow Bentham & Hooker f. in including the concept Stenorrhynchus in the older genus Spiranthes, a new combination must be made.

Spiranthes Lechleri *C. Schweinfurth comb. nov.*

Brachystele Lechleri Schlechter in Fedde Repert. Beihefte 9 (1921) 59—Schlechter ex Mansfeld in Fedde Repert Beihefte 57 (1929) t. 107, nr. 421.

Since the genus *Brachystele* Schltr. is considered to be inseparable from the polymorphic *Spiranthes*, the concept *B. Lechleri* is herewith transferred to the latter genus.

In some Peruvian collections *(Macbride & Featherstone 1224, 1589, 2273)* which are referable to this species, there are often present clusters of very stout tuberoid roots; the height of the plant sometimes exceeds 4 dm. and at most the floral bracts only slightly exceed the flowers. Moreover, the flowers which are slightly larger than those of the type, are designated as bright to deep golden yellow, and the mid-lobe of the lip is commonly transversely oblong or oval-oblong and retuse-apiculate rather than "suborbicular." The dates of collection extend from June 16 to August 21, 1922.

Spiranthes maculata *C. Schweinfurth comb. nov.*

Pelexia maculata Rolfe in Kew Bull. (1893) 7—Summerhayes in Bot. Mag. 158 (1935) t. 9418.

In accordance with our plan of simplification, the genus Pelexia is referred to Spiranthes and a new combination is thus necessitated.

Although the habitat was cited as "not recorded" in the original diagnosis and was later cited by Summerhayes as questionably from Venezuela, we have seen a definitely localized collection from the Herbarium of the Field Museum. The data are as follows:

PERU: La Merced, at about 600 meters altitude, edge of mountain stream, leaves mottled with lighter green, flowers "white tipt, slightly reddish without", August 10-24, 1923, *J. Francis Macbride 5526.*

This Peruvian collection differs from the type in having somewhat larger leaves which are up to about 18 cm. long and 8.5 cm. wide.

Spiranthes Rimbachii *(Schltr.) C. Schweinfurth comb. nov.*

Cyclopogon Rimbachii Schlechter in Fedde Repert. Beihefte 8 (1921) 166.

The transfer of this concept to the genus Spiranthes requires a new combination.

A Peruvian collection of this species has been recently examined. It differs from the Ecuadorian type in the following particulars: one plant reaches about 6 dm. in height (in contrast to a maximum height of 5 dm.), one plant bears six basal leaves and another specimen bears eight cauline sheaths (in contrast to a maximum of four). The lip is slightly broader than that of the type and is about 7 mm. wide.

Ayacucho: Prov. Huanta, Choimacota Valley, at 2900-3000 meters altitude, in shady places in evergreen bush-wood, flowers reddish-white, February 28-March 10, 1926, *A. Weberbauer 7575.*

Spiranthes subumbellata *C. Schweinfurth nom. nov.*

Synassa corymbosa Lindley in Bot. Reg. 19 (1833) sub t. 1618.

Pelexia corymbosa Lindley Gen. & Sp. Orch. Pl. (1840) 482—Kränzlin in Engler Bot. Jahrb. 54, Beibl. 117 (1916) 19.

The inclusion of this species in the genus Spiranthes necessitates a new specific epithet, since the name *corymbosa* has already been used in the genus Spiranthes (S. corymbosa *Kränzl.* in Engler Bot. Jahrb. 54, Beibl. 117 (1916) 17.

Spiranthes vaginata "*Lindl.*" *ex Jackson* in Ind. Kew. (1895) 967.

Neottia vaginata Humboldt, Bonpland & Kunth Nov. Gen. et Sp. 1 (1816) 331—Lindley Gen. & Sp. Orch. Pl. (1840) 472.

Stenorrhynchus vaginatus Sprengel Syst. Veg. 3 (1826) 710.

In Index Kewensis (1895) p. 967, the authorship of this species was attributed to Lindley (Gen. & Sp. Orch. Pl. (1840) 472), and this citation has been continued by various authors subsequently.

However, this concept was cited by Lindley (l.c.) as "Neottia vaginata" and included as No. 32 among a long list of Spiranthes species with the preceding caption "To this section [of Euspiranthes] probably belongs" [this species]. So, while Lindley's obvious intention was to regard the species as a member of the genus Spiranthes, the fact remains that the combination was not specifically made by him. Consequently the citation should be given as above.

NOMENCLATORIAL NOTES AMONG SOUTH AMERICAN ORCHIDS

BY

CHARLES SCHWEINFURTH

During my intensive studies of the orchids of Peru, I have found the following nomenclatorial transfers to be necessary.

Malaxis carnosa *(HBK.) C. Schweinfurth comb. nov.*

Stelis carnosa Humboldt, Bonpland & Kunth Nov. Gen. et Sp. 1 (1816) 362.

Dienia calycina Lindley Gen. & Sp. Orch. Pl. (1830) 23.

Ophrys monophyllos Pavon ex Lindley Gen. & Sp. Orch. Pl. (1830) 23, *in synon.*

Microstylis gracilis Ridley in Journ. Linn. Soc. 24 (1888) 321.

Microstylis calycina Ridley in Journ. Linn. Soc. 24 (1888) 331.

Serapias parasitica Pavon ex Ridley in Journ. Linn. Soc. 24 (1888) 331, *in synon.*

Malaxis calycina O. Kuntze Rev. Gen. Pl. 2 (1891) 673.

Malaxis gracilis O. Kuntze Rev. Gen. Pl. 2 (1891) 673.

Microstylis monticola Schlechter in Fedde Repert. 3 (1906) 17.

Microstylis microtoides Schlechter in Beihefte Bot. Centralbl. 36, Abt. 2 (1918) 381.

Malaxis monticola Ames in Proc. Biol. Soc. Wash. 35 (1922) 84.

A photograph of the type of *Stelis carnosa* together with two flowers from the specimen in the Muséum d'Histoire Naturelle at Paris show that this concept represents the widely distributed Middle American species of Malaxis which has borne the several names cited above, as discussed in Bot. Mus. Leafl. Harv. Univ. 3 (1935) 114.

Stelis carnosa was cited from Prov. Jaen de Bracamoros near Sondorillo and Mandor Rock, at about 6000 feet altitude, *Bonpland s.n.* As *Microstylis calycina*, it was cited from Peru (Pavon) by Ridley (l.c.) Furthermore, it was listed from the Department of Amazonas (Peru) by Schlechter in Fedde Repert. Beihefte 9 (1921) 135.

Malaxis termensis *(Kränzl.) C. Schweinfurth comb. nov.*

Microstylis termensis Kränzlin in Fedde Repert. 1 (1905) 91.

This Peruvian species should be referred to the earlier genus Malaxis.

It is apparently widely distributed in Peru, being found in the departments of Ayacucho, Cuzco, Huánuco and Junín.

Liparis elegantula *Kränzlin* in Engler Bot. Jahrb. 37 (1906) 382.

Liparis Millei Schlechter in Fedde Repert. 15 (1917) 53.

After a careful comparison of the original descriptions of these concepts, supplemented by an excellent photograph of the type of *L. elegantula* and a floral analysis of *L. Millei* made under the direction of Dr. Schlechter, it is certain that they are conspecific. Indeed, the only significant difference is that the leaves of *L. Millei* from Ecuador are described as broadly elliptic, while those of the Peruvian *L. elegantula* are broadly ovate or triangular-ovate and attain a slightly greater width.

Liparis ramosa *Poeppig & Endlicher* Nov. Gen. ac Sp. 2 (1837) 9, t. 112.

Liparis Rusbyi Rolfe in Bull. N. Y. Bot. Gard. 4 (1907) 454.

A comparison of the Bolivian species *L. Rusbyi*, as represented by a photograph of the type, with the Peruvian *L. ramosa*, as shown by the plate of the type (l.c.), indicates that the two concepts are inseparable. *Liparis Rusbyi* appears to have somewhat larger flowers than those of the Peruvian collections referred to *L. ramosa.*

Masdevallia auropurpurea *Reichenbach filius et Warscewicz* in Bonpl. 2 (1854) 115—Woolward The Genus Masdevallia pt. 8 (1896) t.

Masdevallia Herzogii Schlechter in Fedde Repert. Beihefte 10 (1922) 42—Schlechter ex Mansfeld in Fedde Repert. Beihefte 57 (1929) t. 137, nr. 536.

Masdevallia xanthura Schlechter in Fedde Repert. 27 (1929) 39.

A comparison between *M. auropurpurea,* of which we have authentic material, and the Bolivian *M. Herzogii* (illustrated by a floral analysis of the type) shows that the concepts are synonymous. Kränzlin, in his monograph of Masdevallia (in Fedde Repert. Beihefte 34 (1925) 123), regards this concept as a synonym of *Masdevallia brachyura* Lehm. & Kränzl. which he keeps separate from *M. auropurpurea.* We have seen no good material of *M. brachyura.* However, it seems probable that it may prove to be merely a small form of *M. auropurpurea.*

Furthermore, it appears that *M. xanthura* differs from *M. auropurpurea* only in having longer tails to the sepals and in having yellow and violet, instead of yellow and brown, flowers. The bilobulate apex to the petals found in this concept also occurs in *M. auropurpurea.* It therefore seems unjustifiable to maintain *M. xanthura* as a distinct species.

The range of *M. auropurpurea* consequently extends from Colombia, through Ecuador to Bolivia.

Stelis Endresii *Reichenbach filius* in Gard. Chron. (1870) 1373.

Stelis parvibracteata Ames in Orchidaceae 7 (1922) 131.

Stelis glandulosa Ames in Sched. Orch. 3 (Jan. 30, 1923) 3.

Stelis propinqua Ames in Sched. Orch. 6 (Nov. 3, 1923) 55.

Stelis praesecta Schlechter in Fedde Repert. Beihefte 19 (Nov. 25, 1923) 175.

Stelis violascens Schlechter in Fedde Repert. Beihefte 19 (Nov. 25, 1923) 176.

Stelis Huebneri Schlechter in Beihefte Bot. Centralbl. 42, Abt. 2 (1925) 88.

Stelis Endresii appears to be a widely variable species which extends through Middle America from Mexico and Guatemala to Panama, and in South America in Brazil and Peru. Its variability appears in vegetative size (plants up to about 24 cm. high), in the form of the leaf which ranges from elliptic-ligulate with a distinct petiole to oblanceolate with a gradually narrowed base, and in the size of the flowers. Of these the sepals appear to be either equal or slightly unequal in size and to be more or less distinctly papillose within. Sometimes the flowers are pinkish, as in *S. parvibracteata* (instead of the typical shade of greenish or whitish). The sepals are often conspicuously glandular within, as in *S. glandulosa.* Sometimes the flowers appear to be larger than usual with the dorsal sepal 5-nerved, as in *S. propinqua. Stelis praesecta* and *S. violascens* are described as having glabrous flowers which are wine-red or red-violet. The South American *S. Huebneri* has a leaf that is oblanceolate and gradually narrowed below, without the distinct petiole often seen in Central American specimens.

Stelis floribunda *HBK.* Nov. Gen. et Sp. 1 (1816) 362.

Stelis apiculata Schlechter in Fedde Repert. Beihefte 7 (1920) 84; Schlechter ex Mansfeld in Fedde Repert. Beihefte 57 (1929) t. 28, nr. 105, non Lindl. 1858.

Stelis insignis Ames in Sched. Orch. 1 (1922) 5.—*C. Schweinfurth* in Bot. Mus. Leafl. Harv. Univ. 3 (1934) 43.

The receipt of an excellent photograph of the type of *Stelis floribunda* and some of the dried flowers of this specimen from the Muséum d'Histoire Naturelle at Paris show beyond question that it includes the concept described as *S. insignis* Ames.

The latter species diverges from *S. floribunda* in its somewhat greater vegetative size—the stems are up to about 19 cm. tall (contrasted with a maximum of about 10 cm. in *S. floribunda*); the leaf-blade is up to about 13 cm. long and 3.5 cm. wide (contrasted with a length of about 8.2 cm. long and a width of about 2.9 cm. wide in *S. floribunda*). Its sepals also vary from obtuse to subacute.

It appears that the shape of the typical leaf of *S. floribunda* is oblong-elliptic, but a Colombian collection (*Lehmann 6921*), which is correctly referred to that species by Kränzlin, has leaves varying from narrowly elliptic-oblong to narrowly oblong.

A series of Peruvian collections referable to *S. floribunda* differ from the typical form in having leaves which sometimes attain a width of 4 cm., in having commonly but a single inflorescence instead of two to four in a cluster, and in having flowers which are described as greenish white instead of violet (as cited for *S. floribunda*).

In addition to the Colombian specimens mentioned, the following Peruvian collections should be cited:

Dept. Ayacucho: Ccarrapa, between Huanta and Río Apurimac, at 1000 meters altitude, epiphyte on wooded hillside, May 5, 6, 17, 1929, *E. P. Killip & A. C. Smith 22484*; Aina, between Huanta and Río Apurimac, at 750-1000 meters altitude, epiphyte in dense forest, May 7, 17, 1929, *Killip & Smith 22773, 22776.*—Dept. Junín: Huacapistana, at about 1800 meters altitude, epiphyte in densely forested valley, June 6, 1929, *Killip & Smith 24295.*

Stelis purpurea *(Ruiz & Pav.) Willdenow* Sp. Pl. 4 (1805) 140.

Humboldtia purpurea Ruiz & Pavon Syst. Veg. (1798) 235.

Stelis truncata Lindley in Hooker Comp. Bot. Mag. 2 (1836) 353; Fol. Orch. Stelis (1858) 15, no. 115.

Stelis Huancabambae Kränzlin in Engler Bot. Jahrb. 54, Beibl. 117 (1916) 20.

Stelis cordibractea Schlechter in Fedde Repert. Beihefte 8 (1921) 51; Schlechter ex Mansfeld in Fedde Repert. Beihefte 57 (1929) t. 80, nr. 310.

Stelis phaeantha Schlechter in Fedde Repert. Beihefte 9 (1921) 68; Schlechter ex Mansfeld in Fedde Repert. Beihefte 57 (1929) t. 111, nr. 435.

Recently there came to hand an apparently authentic specimen of *Humboldtia purpurea* (=*Stelis purpurea*) from the Ruiz & Pavon collection preserved in Madrid. While this specimen has very imperfect inflorescences, it is otherwise in a serviceable condition and has good flowers.

Stelis truncata, exemplified by a photograph of the type collection, differs from *S. purpurea* only in having proliferous or branched stems and usually (but not always) smaller leaves. However, in the specimen of *Stelis purpurea* above mentioned, there are in the axil of one of the leaves the fragments of two peduncles of which the much stouter one might well represent a proliferous stem.

Stelis Huancabambae, of which we have seen isotype specimens, has usually slightly narrower leaves than those of *S. purpurea,* while the dorsal sepal is commonly somewhat triangular-ovate and more narrowed above than that of *S. purpurea,*—differences which are inconsequential. Contrary to the description of *S. Huancabambae,* its dorsal sepal is 5- to 7-nerved as in *S. purpurea* and the neuration of the lateral sepals is similar.

Stelis cordibractea, of which we have seen a specimen of the type number, seems to differ from *S. purpurea* only in having shorter stems entirely covered by the sheaths and often thicker leaves.

Stelis phaeantha, represented by the description supplemented by a floral analysis made under the direction of Dr. Schlechter, differs from *S. purpurea,* in having narrower leaves with a longer petiole.

Thus it would seem that the concept *Stelis purpurea* should be considered, like the variable *S. Endresii* Reichb. f. of Central America, as a polymorphic species. Besides Peru, it occurs in Colombia and Ecuador.

The color of the flowers is noted as greenish, greenish red with a greenish yellow center, reddish brown, or dark red.

DICHAEA TRICHOCARPA AND DICHAEA SQUARROSA

BY

LOUIS O. WILLIAMS

FOR MANY YEARS *Dichaea trichocarpa* has been the name applied to a common species of Mexican Dichaea which, in 1840, Lindley had described as *Dichaea squarrosa.* Fr. Kränzlin, in his monograph of the genus, in 1923, placed the two species together.

Lindley originally described *Dichaea squarrosa* from a specimen collected by Th. Hartweg at "Mountain of Tuguila" in June. The locality is not known to me, but Hartweg was in Mexico in June 1837 and June 1838. In June 1837, he was probably either in the present state of Guanajuato or in Jalisco. In June 1838, he was probably in Michoacán.

A photograph of the Hartweg specimen (in Lindley's herbarium) is in the Ames Herbarium. Three other specimens were subsequently added to the sheet which contains the type, two from Cuba and one from Mexico. In one corner of the sheet an analytical drawing of a flower has been added. The drawing seems to represent *Dichaea trichocarpa* and was possibly made from one of the Cuban specimens.

Lindley's original description of *Dichaea squarrosa* is rather inadequate, but he does mention that the flowers are large for the genus and apparently white,—both statements being true when applied to the species of the Pacific slope in Mexico but hardly true of the small-flowered *D. trichocarpa* of the West Indies and Central America.

Dichaea trichocarpa (the small-flowered species) is not known to occur on the Pacific slope, that part of Mexico where Hartweg must have collected the type of *D.*

squarrosa. On the contrary there are numerous specimens of *D. squarrosa* from the general region whence Hartweg's specimen might have come. Consequently, on sound morphological characters, I would refer the large-flowered species found on the Pacific slope to *D. squarrosa* and would keep it separate from *D. trichocarpa.*